What is claimed is:

1. A photolithography system comprising:

an alternating phase shifting mask having a phase shift error; and

an illuminator configured for off-axis illumination wherein the off-axis illumination parameters are optimized to compensate for the effects of the phase error.

2. The photolithography system of claim 1 wherein the illuminator uses empirical data in optimizing the off-axis illumination parameters.

3. The photolithography system of claim 2 wherein the empirical data is taken from one or more simulations of an image on the alternating phase shifting mask.

4. A photolithography system, comprising:

an alternating phase shifting mask having a phase shift error;

an illuminator providing a light source; and

a means for controlling the light source to optimize printing of the alternating phase shifting mask.

5. The photolithography system of claim 4 wherein the means for controlling the light source utilizes off-axis illumination.

6. The photolithography system of claim 5 wherein off-axis illumination parameters are optimized from simulations of an image on the alternating phase shifting mask.

7. A method to optimize printing of an alternating phase shifting mask having a phase error, the method comprising the steps of:

configuring an illuminator for off-axis illumination;

performing one or more simulations of an image on the alternating phase shifting mask; and

adjusting off-axis illumination parameters based upon the one or more simulations.

8. The method of claim 7 wherein the step of performing one or more simulations includes varying a depth of focus of the image on the alternating phase shifting mask.

9. The method of claim 7 wherein the step of performing one or more simulations includes varying sigma in and sigma out parameters corresponding to the illuminator.

10. A method to optimize printing of an alternating phase shifting mask having a phase error, the method comprising the steps of:

providing the alternating phase shifting mask having a phase shift error;

providing an illuminator having a light source;

performing one or more simulations on an image of the alternating phase shifting mask; and

providing a means for controlling the light source to optimize printing of the alternating phase shifting mask based upon the one or more simulations.

11. The method of claim 10 wherein the step of providing an illuminator utilizes off-axis illumination.

12. The method of claim 10 wherein the step of performing one or more simulations includes varying a depth of focus of the image on the alternating phase shifting mask.

13. The method of claim 10 wherein the step of performing one or more simulations includes varying sigma in and sigma out parameters corresponding to the illuminator.

14. A method of printing an image from an alternating phase shifting mask at two different wavelengths, the method comprising the steps of:

providing the alternating phase shifting mask;

providing a first illuminator having a first light source at a first wavelength;

printing the image on the alternating phase shifting mask;

providing a second illuminator having a second light source at a second wavelength;

configuring the second illuminator for off-axis illumination;

performing one or more simulations of the image on the alternating phase shifting mask;

adjusting off-axis illumination parameters based upon the one or more simulations; and

printing the image on the alternating phase shifting mask.

15. The method of claim 14 wherein the step of providing a first illuminator utilizes an I-line light source.

16. The method of claim 14 wherein the step of performing one or more simulations includes varying a depth of focus of the image on the alternating phase shifting mask.

17. The method of claim 14 wherein the step of performing one or more simulations includes varying sigma in and sigma out parameters corresponding to the illuminator.

18. The method of claim 14 wherein the step of providing a second illuminator utilizes a deep ultra-violet (UV) light source.

19. A method of printing an image from an alternating phase shifting mask using an illuminator operating at a different wavelength from what the mask was initially designed for, the method comprising the steps of:

providing the alternating phase shifting mask;

providing the illuminator having a light source;

configuring the illuminator for off-axis illumination;

performing one or more simulations of the image on the alternating phase shifting mask;

adjusting off-axis illumination parameters based upon the one or more simulations; and

printing the image on the alternating phase shifting mask.

20. The method of claim 19 wherein the step of performing one or more simulations includes varying a depth of focus of the image on the alternating phase shifting mask.

21. The method of claim 19 wherein the step of performing one or more simulations includes varying sigma in and sigma out parameters corresponding to the illuminator.

22. The method of claim 19 wherein the step of providing the illuminator utilizes a deep ultra-violet (UV) light source.